SFO Sustainability Program and Challenges

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SFO’s Environmental Sustainability Policy

Climate Change / Global Warming
Energy Use
Air Quality
Noise Abatement
Water Resources Protection
Natural Resources Management
Solid Waste Reduction and Recycling
Hazardous Materials and Waste Management and Remediation
Green Buildings and Facilities
GLOBAL CO2e EMISSION BY INDUSTRY

- Energy supply: 25.9%
- Industry: 19.4%
- Agriculture: 13.5%
- Forestry: 17.4%
- Transport: 13.1%
- Residential and commercial buildings: 7.9%
- Waste and wastewater: 2.8%
- CO2 (other): 2.8%
GLOBAL –US – AVIATION-SFO

- Global 30,000 MTons
- US 7054 MTons
- US Transportation 1969 MTons
- Aviation 216 MTons
- SFO?
SFO EMISSION

Scope 1 OWNED AND CONTROLLED ELEC., NG, FUEL

Scope 2 Indirect emission
Airport employee

Scope 3 Indirect and Optional Tenant Emission
Public travel
SFO Climate Action Plan

A Vision to Achieve Carbon Neutrality
CCSF Climate Goal and Implementation Plan

- Ordinance No. 81-08, Departmental Mandates:
  - Lower Greenhouse Gas Emissions to:
    - 25% Below 1990 Level by 2017
    - 40% Below 1990 Level by 2025
    - 80% Below 1990 Level by 2050
  - Submit A DCAP to DOE Annually
SFO electricity and natural gas and fuel consumptions

**Electricity- kWh**

- 130,000,000
- 140,000,000
- 150,000,000
- 160,000,000
- 170,000,000
- 180,000,000

**Natural gas - Therms**

- 160000
- 170000
- 180000
- 190000
- 200000
- 210000
- 220000
- 230000

**Sub Total shuttle bus**

- Gallons
  - 160000
  - 170000
  - 180000
  - 190000
  - 200000
  - 210000
  - 220000
  - 230000

**Subtotal Fleet**

- Gallons
  - 190000
  - 200000
  - 210000
  - 220000
  - 230000
  - 240000
  - 250000
  - 260000
CURRENT EFFORTS TO REDUCE GHG
## Planned GHG Emission Reduction Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Emission Reduction (TPY)</th>
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<tbody>
<tr>
<td>PC Air at B/A B and E</td>
<td>23,600</td>
</tr>
<tr>
<td>Energy Efficiency Projects</td>
<td>21,592</td>
</tr>
<tr>
<td>PC Air at Terminal 2</td>
<td>15,000</td>
</tr>
<tr>
<td>Solid Waste Recycling</td>
<td>2,000</td>
</tr>
<tr>
<td>Fleet Vehicle Replacement</td>
<td>602</td>
</tr>
<tr>
<td>Employee Commute Program</td>
<td>1,116</td>
</tr>
<tr>
<td>T2 LEED Silver</td>
<td>1,676</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>65,586</strong></td>
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<tr>
<td><strong>Subtotal (Measures Underway)</strong></td>
<td><strong>19,278</strong></td>
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AFTER HAVING PICKED THE LOW HANGING FRUITS

• ALTERNATE AVIATION FUEL

• RENEWABLE ENERGY
ALTERNATE AVAIATION FUEL

Life Cycle Environmental Impacts

- Examine fuel life cycle from “well-to-wake.”

- Analyze fleet-wide alternative fuel use.
- Estimate emissions affecting air quality and climate change.

- Use existing tools:
  - Aircraft analysis via FAA-NASA-TC tool suite (Aviation Environmental Portfolio Management Tool, APMT, and Aviation Environmental Design Tool, AEDT).
ALTERNATE AVAIATION FUEL

Life-cycle Carbon Dioxide Emissions

Variation due to:
• Recovery technique
• Processing
• Biomass utilization

Ongoing work:
• Analyze jet fuel
• Biojet pathways
• Uncertainty analysis

To reduce carbon dioxide emissions, need biofuels created from waste products or harvests from non farm land.
SFO Sustainability practices
HISTORY 30’S
HISTORY 50’S
SFO Preliminary Audit

- $600M+ budget
- 30,000 combined employees and
- 1300 Airport employees
- 37M annual passengers
- >125 tenants
- 9.1 million square feet
  (Central Plant, IT and Parking Garages, T1 Except Boarding Area A, T2 Section G36, T3, Central Parking Garage and Car Rental Center)
- 27,200 lighting fixtures
- 265 unique lighting fixture types
- 18,000 tons of chiller capacity
- 70 Mechanical Rooms
- 80 Major Pumps
- 135 Major Air Handlers
- 357 escalators, electric walkways and elevators
FY 2008/09 Total Revenue

$657.8 Million
($ millions)

- Terminal Rents: $162.0 (25%)
- Other Aviation Revenue: $65.1 (10%)
- Other Sales & Services: $59.6 (9%)
- Sale of Electricity: $16.5 (2%)
- Concessions: $99.2 (15%)
- Parking & Ground Transportation: $76.9 (12%)
- Interest Income: $14.8 (2%)
- Fund Balance: $19.8 (3%)
- Landing Fees: $92.9 (14%)
- PFC Revenue: $51.0 (8%)
FY 2008/09 Total Expense

$657.8 Million
($ millions)

Debt Service
$285.4
43%

Police & Fire (Direct Charge)
$52.0
8%

Light, Heat & Power
$33.2
5%

Services of Other Depts
$16.2
3%

Annual Service Payment
$26.4
4%

Small Capital Outlay & Facilities Maintenance
$7.5
1%

Personnel Cost
$134.1
20%

Other Current Expenses and Fixed Charges
$37.9
6%

Contracts
$48.8
7%

Materials & Supplies
$13.1
2%

Equipment
$3.1
1%
SFO Paper reduction

• In 2008 SFO has reduced office paper by 28.5%.
• More than 2,500,000 sheets of paper were reduced.
• A small version of CAP & TRADE system was created by capping quotas at division level and providing guidance on how to maximize the paper savings by using electronic transfer of documents and setting the copying machine default level to two sided.
SFO ZERO WASTE PROGRAM

• In 2008 SFO has achieved the municipal solid waste diversion rate of 62%.

• For the 4th quarter the rate was 71%, which was achieved by separating compostable waste.

• For the terminal 2, the concessionaires will be carrying only the compostable food wares. This will increase the diversion rate.
SFO ENERGY CONSERVATION

• For the month of February 2009, SFO achieved 7.5% reduction in electricity consumption.
• The reduction was achieved ensuring all lights and computers have been turned off after hours and adjusting chillers and boiler operation.
SFO and INNOVATIVE TECHNOLOGY

• SFO is working with San Mateo County for use of Hydrogen fuel
• SFO is considering Fuel-cell technology to provide power for its Wastewater Treatment plant
• SFO is working with FAA and airlines to introduce Continuous Descent Approach (CDA) that will reduce noise and improve fuel efficiency for the aircrafts
• SFO will be attending a meeting for use of Biofuel in aircrafts.
• SFO is reviewing laser technology to convert solid waste into hydrogen fuel
On-board waste separation
Trash-mix paper, bottles, and cans
Use clear bag

After-landing separation by cleaning crew
Mix paper – Bottles and Cans - Trash
Use clear bags

Distribution

TRASH
MIX PAPER
BOTTLES AND CANS

COMPACTOR $XX PER USAGE FOR TRASH. ACCESS CODE PER TENANT

Mix PAPER FREE
BOTTLES AND CANS FREE
Hi Dave,

I wanted to write to let you know that we have finalized the first certification of a Green Business at SFO. Osho Japanese Cuisine in the International Terminal is now a certified Green Business. We have several more that are in the final stages of certification, and I expect to have a handful more for you this month.

Thanks for your continued support in helping to promote the program.

Thanks,
Danielle

Danielle Lee
RecycleWorks Programs Coordinator
Air Quality Enhancement - Energy Conservation Measures

– Clean Fuel Vehicles
  • Biodiesel - 19 Shuttle Buses
  • CNG - 29 Trucks/ Vehicles
  • Electric – 28 Trucks / Vehicles
  • Hybrid-Electric – 6 Trucks / Vehicles

– Solar Energy Generation
  • 2,000 s.f. of Installed Solar Panels
  • 50,000 s.f. of Solar Panels Under Construction

– Aircraft Emissions Reduction
  • 400 Htz Plug-In Power Supply at the Gates
  • Conditioned Air Supply at the Gates
Air Quality Enhancement - Energy Conservation Measures

• High Efficiency Light Bulb Replacement Program
• CNG Fuel Dispensing Stations
• Planning Hydrogen-CNG Blend Dispensing Facilities
• BART Extension to SFO
• People Mover Air Train at SFO
• Eliminated Redundant Refrigerator & Microwave Oven Use
Water Quality Enhancement Measures

- 8.6 Million Gallons of Storm Runoff Detention Capacity
- Storm Runoff Treatment In Industrial Treatment Plant
- Incorporation of Bio-Swales in Entrance-Way Landscaping
- Separate Sanitary and Industrial Wastewater Treatment Plants
- Completed $37 Million Upgrade of Sanitary Plant
- Planned $25 Million Upgrade of Industrial Plant
Water Conservation Measures

• Use of Low Flush Toilets throughout Airport
• Use of Automatic Sink Faucets throughout Airport
• Use of Treated Wastewater for Some Landscaping Irrigation
• Use of Native Landscaping Species
Reduction of Global Warming Gas Emissions
RECYCLING AT SFO

![Graph showing recycling percentage at SFO from 2004 to 2006.](image)

![Images of people engaging in recycling activities at SFO.](images)
CLEAN AIR

• 47% OF PASSANGERS USE HOV
• TWO CNG STATIONS
• HYDROGEN BLEND UNDER CONSIDERATION
Noise Abatement Achievements

- Provide information regarding aircraft operations to the general public through [link](http://www.flyquietsfo.com/LiveRadarFlightTrack.htm)
- Through its noise insulation program, SFO became the first major airport in California to succeed in reducing all incompatible land uses within the State 65 CNEL Noise contour to zero and to operate without a variance.
- **SFO PARTNERS TO ACHIEVE QUIETER SKIES**
- NASA, Boeing and United Airlines Join Forces to Save Fuel & Reduce Noise
GREEN BUILDINGS

- SILVER STANDARDS MINIMUM
- **Sustainable Products** – The interior of the International Terminal Building contains 21,000 square feet of Forest Stewardship Council (FSC) certified cherry wood paneling on the huge wall above the departure lobby. The wall is one of the world’s largest installations of veneer from a certified, well-managed forest.
GREEN BUILDINGS

• **Energy Management and Control System** – The International Terminal Building’s overall design is 30 percent more efficient than required under the code.

• **Native Plants** – Ground landscaping for the International Terminal Building is comprised of native plants and trees grown specifically in Bay Area nurseries for SFO.
CHALLENGES

• Climate change:
  – Ownership of emissions and mitigations

• Solid waste
  – Behavior, Education,

• Energy conservation
  – Operation changes and tolerance level
  – 19XX building codes and old thinking
    • Escalators
    • Waterless urinals
Your Challenges

• Define Sustainability
  – 19xx definition
  – 2000 -2009 definition
  – 2010 – 2020 definition

• A sustainable aviation enterprise is one where the demand for growth can be enabled by ensuring that the environmental impact is reduced to acceptable levels

• MANY COMPETING INTERESTS
## GROWTH ACCEPTABLE LEVELS

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<th>GROWTH</th>
<th>ACCEPTABLE LEVELS</th>
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$ UP AND DOWN, SEATS, ACCESS, CHOICES, ENVIRONMENT ETC

Motivation modifiers: Sternness, Incentives, Disincentives, Mystery